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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,786	08/21/2003	Phil MacPhail	115-31US/12667/100113	6922
23838	7590	04/12/2006	EXAMINER	
KENYON & KENYON LLP 1500 K STREET N.W. SUITE 700 WASHINGTON, DC 20005			WHITTINGTON, KENNETH	
			ART UNIT	PAPER NUMBER
			2862	

DATE MAILED: 04/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/644,786

Applicant(s)

MACPHAIL ET AL.

Examiner

Kenneth J. Whittington

Art Unit

2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14, 16, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 November 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

Art Unit: 2862

#### DETAILED ACTION

The Amendment filed February 7, 2006 has been entered and considered.

#### *Response to Arguments*

Applicant's arguments with respect to the 112 rejection of claims 1-8 have been fully considered but they are not persuasive. While Applicant has stated that electronic circuit "to supply current" without resistors is known, the claims are not so limited. As is interpreted by the Examiner, the integrated circuit comprises a current source ... and absent a series resistor. Thus, as recited in the claims, the integrated circuit can be absent a series resistor, not simply the current source.

Furthermore, two of the reference cited by Applicant (US6,031,366 and US6,181,969) each have resistors in the integrated circuitry.

Regarding the rejections of claims 9-12, 13, 14, 16, 19 and 20, over Kurihara et al. (US 5,757,184) and combinations thereof, the arguments are persuasive and accordingly the rejections based thereon are withdrawn.

Art Unit: 2862

However, upon further review of the claims in view of Applicant's arguments and the prior art, the claims are rejected as follows.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding these claims, they recite the feature that the integrated circuit is "absent a series resistor". At most, the specification and drawings illustrate there is no resistor in the sensor section that is directly connected to the sensor coil as shown in FIG. 4 (in comparison to FIGS. 1 and 2). However, the recitation that "the integrated circuit ... absent a series resistor" is not described or enabled in any manner.

Art Unit: 2862

Initially, it is noted that Applicant has not specifically provided the integrated circuit diagrams for the claimed invention other than the simple box diagram shown in FIG. 5 of the present application.

Furthermore, it is well known in the art that circuitry components in association require series resistors to cut current and voltage at various stages of each component. For example, note the circuit diagrams showing resistors as integral components of the drivers, differentiators, amplifiers comparators, etc. of shown in US6,427,349, US6,346,892, US5,124,648 and US4,300,095 as well as those portions of Vernon et al. (US6,268,725) and Kurihara et al. (US5,757,184) showing resistors as part of the circuitry. Therefore, as specifically disclosed and well known in the art, resistors are an integral part of each of the circuitry components associated with a magnetometer coil.

Applicant has not shown how the integrated circuit of the claimed invention in association with a magnetometer coil can be devoid of series resistors. Furthermore, Applicant has not provided any basis on how one having ordinary skill in the art would make such circuits without undue experimentation.

For purposes of examination, the claims will be interpreted as specifically shown by Applicant in FIGS. 4 and 5, namely that

Art Unit: 2862

there are no series resistors between the current source and the coil.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 6, 7, 9-14, 16, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Bauer et al. (US 4,728,888). Regarding claims 1, 2, 4, 6, 9-14 and 16, Bauer discloses a method for determining a magnetic field comprising:

using an integrated circuit to provide a current signal to a coil via a pair of contacts (See Bauer FIG. 2, col. 2, lines 53-56, note contacts to coil 20), the integrated circuit having a current source and absent a series resistor (See FIG. 2, note current sources 17 and 18 and no series resistor to coil 20),

the coil comprising a ferromagnetic core (See FIG. 2, note core 20 with coil);

the integrated circuit providing a differential periodic time varying signal having a triangular waveform using a signal

Art Unit: 2862

generator to the coil resulting in a first and second electromagnetic saturation of the core each having opposite polarity (See FIG. 2, note at least items 17 and 18 and see col. 2, line 53 to col. 3, line 24),

monitoring a voltage potential between the pair of contacts and determining a time information related to a duty cycle associated with a first electromagnetic saturation of the core, and a second electromagnetic saturation of the core, the second electromagnetic saturation of the core having an opposite polarity to the first electromagnetic saturation and determining a direction based upon characteristics of the current signal, and the duty cycle (See col. 3, line 25 to col. 4, line 31).

Regarding claims 7 and 19, Bauer discloses a second fluxgate magnetometer having the same operation and construction at the fluxgate described above, only it is oriented at 90 degrees with respect thereto (See col. 2, lines 21-53). Accordingly, in operation, it would have the same operation using third and fourth saturations of the core.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2862

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bauer in view of Kawahito et al. (A 2-D CMOS Microfluxgate Sensor System for Digital Detection of Weak Magnetic fields). Bauer teaches the features noted above.

However, Bauer does not explicitly teach a square wave to triangular wave converter. Kawahito et al. teaches applying a triangular wave form to a coil in a fluxgate sensor using a square to triangular wave generator (See FIG. 8 on page 1847). It would have been obvious to use the square to triangular wave converter as the triangular wave generator in Bauer. One having ordinary skill in the art would have been motivated to do so to create a consistent triangular signal wave-form based on a digital clock signal (See Kawahito et al. page 1848).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bauer in view of Vernon et al. (US 6,268,725), hereinafter Vernon. Bauer teaches the features noted above by does not explicitly teach the arrangement of the magnetometer off the substrate. Vernon et al. teaches that magnetometers can



Art Unit: 2862

be arranged on a chip such that either the sensor portion including the coil and core are located either on the same chip or located off chip on a separate substrate (See Vernon et al. col. 4, lines 37-41). It would have been obvious at the time the invention was made to incorporate the circuitry onto a chip (substrate) and to either have the sensor portion on the same chip or another chip from the circuitry. One having ordinary skill in the art would have been motivated to place the components on a substrate or chip to provide a stable platform onto which to assemble and connect the various circuit components and further one having ordinary skill in the art would motivated to either place the sensor on a separate substrate or the same substrate as the other circuitry because such arrangements are art recognized equivalents for measuring magnetic fields as recognized by Vernon et al., the placement being depending on design parameters of the system (see same paragraphs).

Claims 8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bauer in view of Farrar (US 4,918,824). Bauer teaches the features as outlined above, but only specifically two axes. Farrar teaches of providing a third fluxgate magnetometer into a compass assembly to create a three

Art Unit: 2862

axis orthogonal system (See Farrar col. 18, line 42 to col. 19, line 40). It would have been obvious to modify Bauer to have three fluxgate magnetometer assemblies each oriented at 90 degrees with respect to each other. Such apparatus would provide the fifth and sixth saturations of the third axis coil fluxgate. One having ordinary skill in the art would have been motivated to make such a modification to provide measurement of all three axis of the magnetic field which provides direction and attitude, pitch and roll of the assembly (See same paragraphs of Farrar).

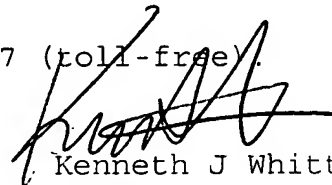
#### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2862

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kenneth J Whittington  
Examiner  
Art Unit 2862

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